EXHIBIT B

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Updating the Intercarrier Compensation	)	WC Docket No. 18-155
Regime to Eliminate Access	)	
Arbitrage	)	

EXPERT REPORT OF DANIEL E. INGBERMAN

August 24, 2018

Table of Contents

I. INTRODUCTION

I.A. Qualifications

1. I am Daniel E. Ingberman. I provide expert economic consulting services in conjunction with several economics and finance consulting and expert services firms.
2. I hold a Ph.D. in Economics, awarded in 1986 by the Tepper School of Business at Carnegie Mellon University, where I was also a Sloan Foundation Doctoral Dissertation Fellow and awarded the Alexander Henderson Award for Excellence in Economic Theory. In addition to my Ph.D., I also hold an M.S. Degree in Economics, awarded by Tepper in 1983, and an A.B. Degree from Duke University, awarded in 1981, where I majored in Economics and History and was inducted into Phi Beta Kappa.
3. I taught at the University of California, Berkeley, starting in 2001. From 2001 to 2005 I held the position of Visiting Associate Professor at the Haas School of Business, where I taught graduate business students in my MBA classes, "Economic Analysis for Business Decisions" and "Competitive Strategy and Corporate Strategy." Also, starting in the 2002–2003 academic year and continuing through 2010, I taught "Law and Economics I (LS 145)" and "Law and Economics II (LS 147)," which are undergraduate courses in the Legal Studies Department, an undergraduate program in the Boalt School of Law. Since 2011, I have held the position of Adjunct Professor of Managerial Economics at the Olin School (Washington University in St. Louis), where I teach "Competitive Strategy and Industry Analysis" to executive MBA students. I also taught at Olin from 1993 to 1998 as a Visiting Associate Professor and later as an Associate Professor. Prior to my initial appointment at Olin in 1993, I taught from 1985 to 1993 at the Wharton School of the University of Pennsylvania (as the Anheuser-Busch Lecturer and, later, as the Anheuser-Busch Assistant Professor of Public Policy and Management), and from 1982 to 1985 at the Graduate School of Industrial Administration at Carnegie Mellon University (as a Lecturer).
4. Overall, I have taught undergraduate, MBA, professional MBA, executive MBA, MA, and Ph.D. students in Economics, Public Policy, Legal Studies, Management,

Decision Sciences, Regional Sciences, and other related fields. I have supervised Ph.D. research, teaching, and dissertations. I have won teaching awards (at both Wharton and Olin) and received a Dean's commendation for perfect median evaluation scores in my core EMBA course at Haas.

5. My teaching and research interests span a broad range of subject matters, including the economics of legal rules and institutions; econometrics and statistics; public economics; and industrial organization, business strategy, and competition policy. I have taught courses in competitive and corporate strategy; economic analysis of law; macroeconomics; managerial economics; microeconomics; research methods; political analysis and political economy; political, regulatory, legal and market environment of business and determinants of business strategy; public economics; public policy; social choice and social justice; economics of torts and products liability; economics of damages, including punitive damages; and litigation strategy and settlement incentives.
6. As detailed in my curriculum vitae, I have authored or co-authored more than 20 published peer-reviewed academic articles. My scholarly research is ongoing and covers a variety of areas. It has been presented in a variety of academic and non-academic settings, including conferences, faculty workshops, legislative hearings, and professional presentations. I have also served as an independent referee in reviewing articles for major journals.
7. I have substantial experience in economic consulting. Plaintiffs and defendants have retained me as an expert economist in litigation matters involving antitrust, contracts, intellectual property, and products liability issues, as well as other situations where it is necessary to assess the economic impact of policy or conduct. I have developed my own independent analyses and have reviewed and commented on the analyses offered by other experts. I have presented my opinions in the form of expert reports, declarations, and/or oral testimony. I have also served as an expert in the economic analysis of punitive damages.
8. In my academic and consulting activities, I have become familiar with the economics of a range of industries and products, including: automobiles and parts; biotechnology; computer components and software; construction materials,

including carpets, siding, and drywall; consumer products; credit cards; display technologies; food; internet commerce and distribution; medical devices and pharmaceuticals; music; oil; publishing; semiconductors; and, telecommunications markets, transmission, and equipment. For example, recently I advised the Department of Justice regarding the competitive effects of the proposed AT&T/T-Mobile merger and assisted Samsung in its dispute with Qualcomm regarding FRAND royalties on handsets.

9. A current copy of my curriculum vitae, including professional appointments, publications, and a list of my prior testifying and consulting experience, is included as **Attachment A**.

10. I am being compensated for my work in this matter at my normal 2018 rate of $925 per billable hour.

I.B. Assignment

11. Counsel for certain Competitive Local Exchange Carriers (the "CLECs") asked me to evaluate an assertion made by the Federal Communications Commission ("FCC" or "Commission") in the Notice of Proposed Rulemaking in Docket Number 18-155, *In the Matter of Updating the Intercarrier Compensation Regime to Eliminate Access Arbitrage*,[1] which claims that access stimulation "harms consumers." The CLECs also asked that I form my own expert opinion as to the economic efficiency properties of access stimulation arrangements.

II. SUMMARY OF ANALYSIS

12. The first fundamental theorem of welfare economics indicates that, under broad conditions, markets yield (Pareto) efficient outcomes. That is, there is no reallocation of resources, production, or consumption which can make at least some people better off, and no one worse off. When those conditions are violated, however, markets need not reach equilibrium, and so efficiency cannot be guaranteed. For example, network effects and scale economies are outside the set

[1] *In the Matter of Updating the Intercarrier Compensation Regime to Eliminate Access Arbitrage*, WC Docket No. 18-155 (June 5, 2018).

of guaranteeing conditions.[2]

13. In this report, I present two simple models of messaging markets to evaluate the competitive and efficiency implications of "access stimulation," which I view as a method of "purchasing" additional volume by a smaller rural carrier. Specifically, an "access-stimulating" local carrier's network is generally defined by two characteristics. First, it is smaller and located in rural areas and, therefore, may be costlier to use than larger (*i.e.*, more urban) networks. Second, compared to the rates paid by its other customers, the access-stimulating carrier offers discounted rates in the form of revenue sharing to entities that agree to site incremental traffic in their network (*i.e.*, free conference calling and broadcasting providers).

14. Some commenters, particularly interexchange carriers, have argued that access-stimulation by these small networks is inefficient, uneconomical, and lacking a legitimate business justification, because terminating calls at these small networks in rural areas is potentially more costly than terminating this traffic on a larger network, typically in a more urban area.[3]

15. The access charges paid by interexchange carriers, however, are only part of the efficiency equation. Consumer surplus matters as well.[4] Generally, the efficiency of any arrangement in the marketplace depends on demand, technology,

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[2] The proof that competitive equilibrium exists relies on the assumption that there are no increasing returns to scale in production. In that case, firms' demand functions are guaranteed to be continuous, which is a mathematical requirement of the proof of the existence of a competitive equilibrium. The welfare theorem shows that competitive equilibria are efficient (*i.e.*, Pareto Optimal). *See, e.g.*, HAL R. VARIAN, MICROECONOMIC ANALYSIS 164, 184 (1978) (citing GERALD DEBREU, THEORY OF VALUE (1959)). When increasing returns are present, competitive equilibria can still exist whenever firm demand functions are continuous, even though the standard proofs used to guarantee existence need not apply directly.

[3] *See, e.g.,* Comments of AT&T, at 1, WC Docket No. 18-155 (July 20, 2018) (asserting that rural CLECs engage in access stimulation "not for any legitimate engineering or business reasons, but solely to allow the collection and dispersal of inflated intercarrier compensation revenues"); Comments of Verizon Communications, Inc., at 1, WC Docket No. 18-155 (July 20, 2018) (referring to access stimulation as "[u]necomonical arbitrage schemes"); Reply Comments of AT&T, at 9, WC Docket No. 18-155 (Aug. 3, 2018) (asserting that access charges are a cost that a long-distance carrier may pass on to consumers, but providing no evidence that access stimulation-related charges, in particular, are material to the rates set by long-distance carriers).

[4] Other factors may also be relevant to the efficiency equation, including, but not limited to: (1) the desire to ensure rural consumers have access to competitive alternatives; (2) the ability and willingness of carriers to provide consumers with additional services, including broadband; and (3) the savings consumers realize by using "free conferencing" services, rather than having to pay to use more expensive offerings.

competition, and institutional arrangements. Network and scale economies imply spillover consequences, which may extend to upstream and downstream competition as well. Thus, a complex set of interactions will determine efficiency.

16. Section 0 analyzes a simple market for telecommunications designed to focus on the effects of returns to scale, while abstracting – for now – from many other elements of interest.

17. In the example, there are two communities, large and small. Each locality has its own telecommunications network. Each uses the same technology with the same fixed and marginal costs of traffic. All consumers have the same demand curves. Inter-and intra-network traffic is equally costly.

18. There are no access charges for switching or transport beyond the central office. Instead, a "central office bill and keep" pricing regime is in place. That is, each network bills its own local customers and keeps the entire proceeds.[5] Prices to users of each network equal the average (economic) cost of all traffic originating in the locality.

19. Even though it may be costlier to site the incremental demand in the smaller network, it can be most efficient to do so. Specifically, siting in the smaller network is more efficient when the incremental traffic causes small network costs and prices to fall sufficiently so that the pre-existing small network demanders' gains in consumer surplus exceed the larger network's gains by more than the amount

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[5] It is known that "Central Office Bill-And-Keep," in which the calling party's network is responsible for the cost of transporting the call to the called party's network's central office, leads to efficient incentives for carriers. *See* Patrick DeGraba, *Central Office Bill and Keep as a Unified Intercarrier Compensation Regime*, 19 YALE J. REG. 37 (2002) (hereinafter "DeGraba 2002"). DeGraba notes that:

> In the early stages of moving toward a competitive market – when incumbent local carriers still possess monopoly power over local network facilities – it will most likely be necessary to require the incumbents to provide transport facilities to interconnecting networks at regulated rates. Nevertheless, even if the incumbent network provides the facilities, the cost of transporting the call will remain on the calling party's network, which will either lease the incumbent's facilities or purchase transport services from the incumbent.

Id. at 41 n.13. In a related paper, DeGraba shows that it is most efficient when calling and called parties share the cost of the call, in proportion to the benefits they receive. *See* Patrick DeGraba, *Efficient Intercarrier Compensation for Competing Networks When Customers Share the Value of a Call*, 12 J. ECON. & MGMT. STRATEGY 207 (2003). Thus, a system in which two networks exchange traffic at specified points on a bill-and-keep basis can generate more efficient network utilization than a regime in which the calling party bears all the costs.

needed to subsidize the incremental traffic for the difference in the market prices between the small and large networks. I demonstrate that there are always technologies, demand functions, and constellations of pre-existing demand for which this is so.

20. That is, under these assumptions, when it is efficient to site the incremental traffic in the small network, market participants' unilateral incentives are expected to lead them to that outcome. And, whenever siting in the small network is a market equilibrium, then it is efficient.
21. However, other specifications of the responsiveness of demand and costs to incremental volume can imply it is efficient to site the incremental traffic in the large network. If this is true, however, the small network will not outbid the large one, and, in equilibrium, markets will efficiently site the incremental traffic in the large network.
22. Section IV provides the proof of the two major propositions underlying the efficiency analysis.
23. Section V elaborates upon the model in the context of CLECs interacting with rate-of-return regulated entities, such as CEA providers, when IXCs connect to LECs through CEA providers. The same result holds: markets will site incremental traffic with a small network CLEC only when it is efficient.
24. Section VI discusses the conclusions that I reach, including my conclusion that, when access stimulation is in market equilibrium, policymakers should respect this market outcome. That is, market arrangements concerning the siting of telecommunications traffic are likely to be efficient. Thus, efficiency is not likely to be improved by regulatory interventions that reallocate traffic that is currently sited in large or small networks through voluntary market arrangements.

III. RETURNS TO SCALE AND CONSUMER SURPLUS

25. Consider two communications networks, large (L) and small (S) whose customers generate and exchange intra-network and inter-network messages.[6] Assume network L – which has more traffic – has lower costs, and that, generally, a network's unit and marginal costs fall as it acquires more traffic. Specifically, the fixed and variable costs of the communications technology are such that the (economic) unit cost M_L of originating and terminating messages (intra- and inter-network combined) generated in network L is strictly less than M_S, the unit cost in network S. Assume that the marginal costs of any type of messages t are also no larger in network L as compared to network S: $m_{St} \leq m_{Lt}$.
26. Assume competition ensures that prices to each networks' end user customers are equal to their economic unit costs M_L and M_S, which are functions of the total traffic on each network. Each network bills its own customers for its costs and keeps the proceeds. There are no access charges associated with any services provided beyond the central office.
27. Suppose now that incremental traffic totaling I messages is to be added to the system. It can be sited in either network or divided between the two. However, the large network will continue to have more traffic, irrespective of where the incremental traffic is sited.
28. Define a *market equilibrium* as the (non-cooperative Nash equilibrium) situation in which each player plays their best individually rational strategies and all potential gains from trade are exhausted.
29. The basic results can now be stated:

> **Proposition 1**. For any networks S and L as above, there always exists consumer demands and communications technologies, such that siting all the incremental demand in the small network S is both efficient and a market equilibrium.

[6] This example abstracts from the details of interconnection. For concreteness, one can assume that L and S connect directly or indirectly through a third party. *See* Section IV.

Proposition 2. If siting all the incremental demand in the small network *S* is not efficient, then it cannot be a market equilibrium.

30. The proofs of these propositions are found in Section IV.

31. Siting the incremental traffic in the small network can only be efficient when the gain in consumer surplus among the pre-existing small network demand from the incremental traffic, less the amount needed to compensate the incremental traffic for the difference in prices between the networks, exceeds the gain in surplus that the large network would obtain from siting the incremental traffic there instead. As long as this condition holds, gains to trade are realized by siting the incremental traffic in the small network: the small network can effectively outbid the large until those gains are exhausted. Thus, small network siting is a market equilibrium in this case.

32. For example, suppose that economies of scale are nearly exhausted in the large network, so siting the incremental traffic there has little or no effect on prices to pre-existing large network customers. Thus, the large network's gain in consumer surplus from the incremental traffic goes to zero. Suppose also that the incremental traffic allows the small network to gain substantial scale economies, so siting there would produce a correspondingly substantial increase in consumer surplus among the pre-existing small network demand. When the incremental traffic is large enough so that it would drive the unit cost in the small network close enough to that of the large network, the small network can efficiently compensate the incremental traffic for the difference in prices between the networks. In this case, the small network can profitably compensate the incremental traffic for the difference in prices between the networks, while still having enough surplus left over to leave its pre-existing customers better off.

33. Such an example is depicted in **Figure 1**. Before any traffic is added, demand in is D_1 (dark blue) in the small network and D_3 (grey) in the large network. Unit costs (light blue) fall as traffic increases, up to a point. However, the large network is sufficiently large so that additional demand does not result in further scale

economies.

34. Total traffic in the large network is initially shown as Q_3^* (blue dot and vertical dotted line). If the additional demand is sited in the large network, the demand shifts out and the new demand (yellow) generates total traffic shown as Q_4^* (rust dot and vertical dotted line).

35. The incremental traffic is a total quantity equal to Q_4^* minus Q_3^*. To be induced to locate in the small network, this traffic must be offered at a price that is no larger than the large network price. If sited in the small network, the unit cost is found at the intersection of the cost curve and the orange demand curve, which is derived by adding Q_4^* minus Q_3^* at every price to D_1 (the original small network demand curve).

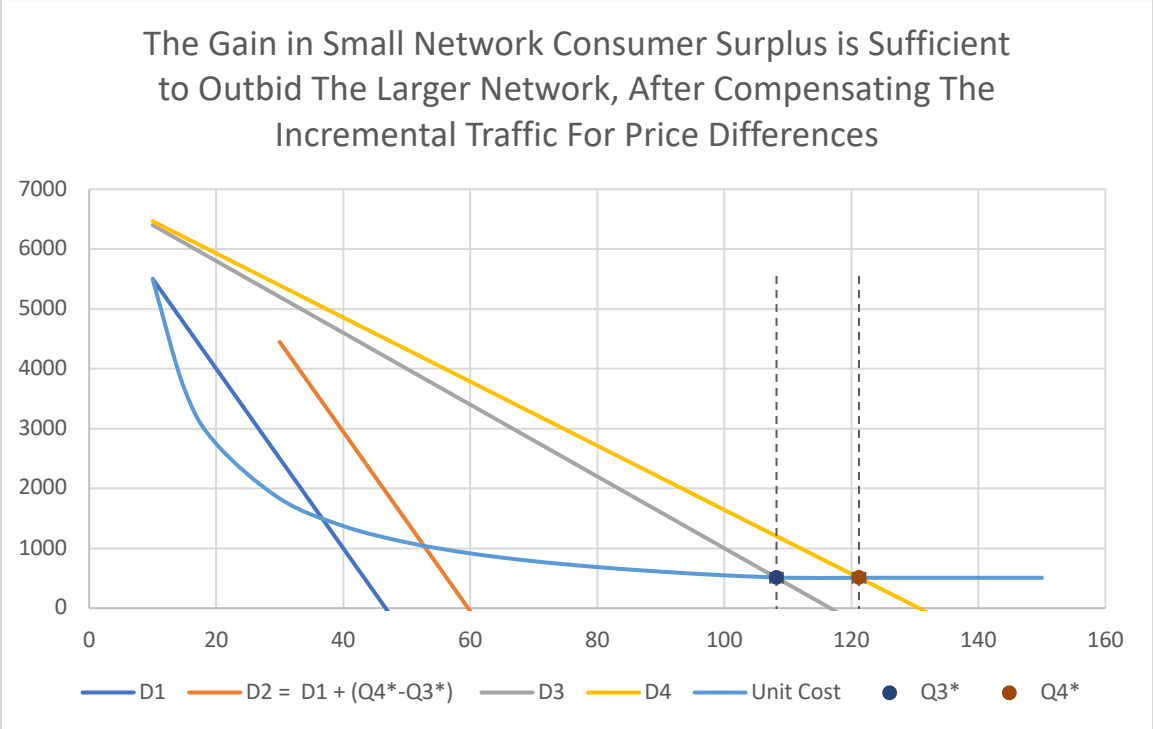

Figure 1

36. In this example, the incremental traffic reduces unit costs in the small network, which lowers prices there and generates consumer surplus for the pre-existing demand. By contrast, scale economies are already exhausted in the large network, so siting the incremental traffic there generates no consumer surplus for the pre-existing demand in that network. Parameter values have been chosen so that the increase in consumer surplus is larger than the amount needed to compensate the

incremental demand for the difference in prices between the large and small networks.[7]

37. In summary, Propositions 1 and 2 demonstrate that, under plausible conditions, siting incremental traffic in the small network – at a subsidized price – is efficient whenever it is a market outcome. This is true despite the assumption that siting in the large network is less expensive.

IV. PROOFS OF PROPOSITIONS

38. Each network's prices equal its economic unit costs. Therefore, producer surplus always equals zero. Total welfare is therefore the sum of consumer surplus in each of the networks, $C_S + C_L$.

39. For $J = S, L$, let $M_J(i)$ denote the unit costs in network J when i messages are added to that network. Also let $C_J(i)$ denote the consumer surplus among the pre-existing demand as a result of adding traffic i to network J.

40. Note also that if it does choose to site in the small network, the incremental demand pays the same unit price (due to the subsidy of $I * \left(M_L(I) - M_S(I)\right)$ by locating in the small network) and has the same usage as if it were in the large network.

41. Define $\Delta M_J(i) = M_J(i) - M_J(0)$, and $\Delta C_J(i) = C_J(i) - C_J(0)$. Under the assumptions made, for any networks S and L, one can choose a technology such that

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[7] In the example, unit costs in each network are equal to 54,900 divided by Q (the traffic in that network) up to Q_3^* and are constant thereafter. The demand curve D_3 is specified by a willingness to pay equal to -60Q + 7000. If sited in the large network, the incremental demand is added to D_3 in the form of additional identical demanders (so the price intercept of the new demand, D_4, is the same as D_3). D_4 is specified by a willingness to pay equal to approximately -53.6Q + 7000. Demand D_3 crosses the unit cost curve at Q_3^* (approximately 108.2) and D_4 crosses the unit cost at Q_4^* (approximately 121.2). In each case, the implied unit cost (network unit price) of traffic is equal to approximately 507.3. Since siting the incremental demand in the large network does not reduce unit costs there, it does not generate any additional consumer surplus for the pre-existing demand in that network.

D_1 is defined by a willingness to pay equal to -150Q + 7000. Without the incremental traffic, unit costs cross D_1 at quantity of about 39.7, where the unit cost equals about 1496.3. D_2 is derived by adding $Q_4^* - Q_3^*$ to D_1, at every price. The intersection of D_2 and the unit cost curve defines the price that will prevail in the small network if the incremental traffic is located there. In this case that price is about 1041.6. The change in consumer surplus in the small network is 17,371.6 whereas the cost to compensate the incremental demand for the difference in prices between the networks equals about 6937.3. Thus, the incremental demand can be fully compensated for the price difference while leaving positive surplus gains in the small network. Indeed, the small network could offer a zero price to the incremental demand while still earning positive net surplus from siting it (equal to about 3846.2).

Additional details are available from the author upon request.

$$\Delta C_S(I) - \left[I * \left(M_L(I) - M_S(I) \right) \right] > \Delta C_L(I). \qquad (*)$$

42. For example, choose a technology that has
    i. $\Delta M_L(I) \to 0$, and
    ii. $M_L(I) - M_S(I) \to 0$.
43. Note that 43.i. implies $\Delta M_L(I) \to 0$, which in turn implies that $\Delta C_L(I) \to 0$. Similarly, 43.ii. implies that $\left[I * \left(M_L(I) - M_S(I) \right) \right] \to 0$. But due to returns to scale, $\Delta C_S(I) > 0$.
44. Therefore, under the assumptions made, condition (*) holds. This completes the proof of Proposition 1.
45. Regarding Proposition 2, note that a market equilibrium requires that all participants follow their individual self-interests. When siting the incremental quantity in network *S* is an equilibrium, it must be true that:
    i. The small network generates enough surplus from the incremental traffic to be able to compensate the incremental traffic for the price difference between the large and small networks and outbid the larger network for the incremental traffic.
    ii. This requires that the small network's net consumer surplus, *i.e.*, its consumer surplus less the amount needed to compensate the incremental traffic, is strictly positive:
    $$\Delta C_S(I) - \left[I * \left(M_L(I) - M_S(I) \right) \right] > 0.$$
    iii. It also requires that the small network's net surplus from the incremental traffic exceeds the surplus the large network would obtain from that traffic, considering the fact that the large network does not need to provide compensation, *i.e.*:
    $$\Delta C_S(I) - \left[I * \left(M_L(I) - M_S(I) \right) \right] > \Delta C_L(I).$$
46. Combining the conditions in 46.iii. and 46.ii. yields condition (*), which completes the proof of Proposition 2.

V. COMPLEMENTARY COEXISTENCE OF COMPETITIVE AND RATE-OF-RETURN REGULATED PROVIDERS

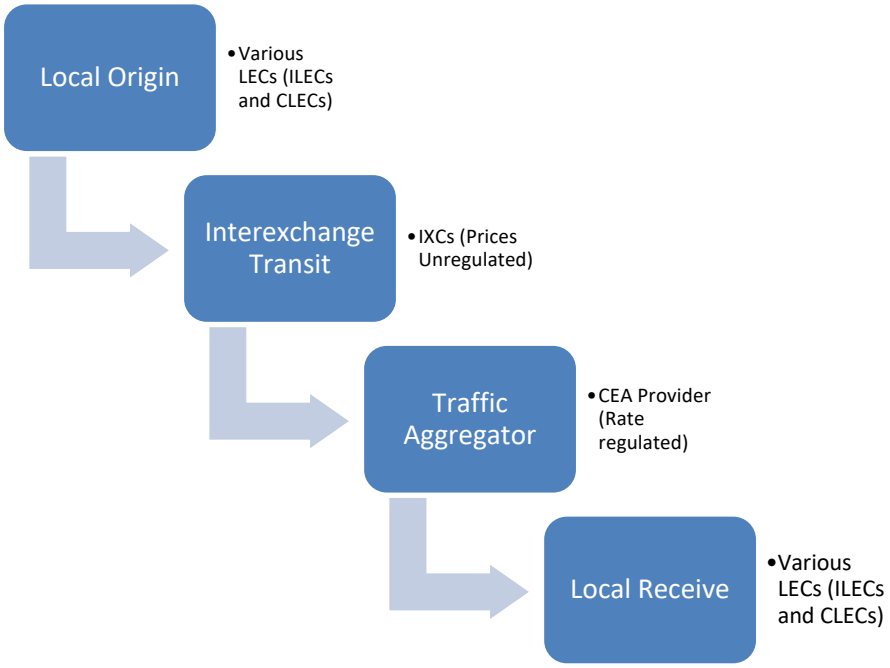

Figure 2

47. Elements of U.S. telecommunications law have enabled competitive service providers ("CLECs") to coexist with incumbent providers ("ILECs") and, in certain rural states, centralized equal access providers ("CEA providers"), which provide interconnections between local networks and long distance providers ("IXCs").[8]

48. **Figure 2** illustrates the general roles of each entity in communications.[9] Analytically, assume the following:

    a. To send and receive messages, end users engage the services of a LEC

[8] *See, e.g.*, 47 U.S.C. § 251 (requiring direct or indirect interconnection of incumbent and competitive carriers); *see also In re: AT&T Corp. v. Iowa Network Services, Inc. d/b/a Aureon Network Services*, 32 F.C.C. Rcd. 9677, ¶ 19 (Nov. 7, 2017) ("AT&T argues that CEA service 'was approved for the limited purpose of facilitating the provision of equal access service to small, rural LECs carrying very low traffic volumes' and that 'access stimulation traffic has virtually nothing in common with legitimate CEA traffic.' As an initial matter, AT&T overstates its claim concerning the 'limited purpose' of the CEA service. The order authorizing a CEA network in Iowa states—and subsequent authority reaffirms—that Aureon's CEA network also would serve to 'speed the availability of high quality varied competitive services to small towns and rural areas.' Further, AT&T's allegation that CEA networks were intended to carry low traffic volumes is of little weight since, as a Section 61.38 carrier, Aureon's calculated rates should decrease to reflect the increase in the volume of traffic.") (internal citations omitted).

[9] **Figure 2** is analogous to Figure 1 in DeGraba 2002.

(ILEC or CLEC) to provide "local" service and an IXC to provide "long distance" service.[10] These entities bill their customers directly. When LECs compete, customers choose the LEC that offers them the best combination of prices and services.

b. ILECs operate under a "must serve" mandate known as "carrier of last resort" obligations, but they are eligible to receive explicit subsidies in order to maintain their profitability. All end users can engage the services of an ILEC.

c. Compared to ILECs, CLECs have access to newer technology, which enables lower costs and/or the bundling of other valuable services or attributes (*e.g.*, quality). CLECs may share facilities (fixed costs) with nearby ILECs or may have their own facilities. If they share facilities, they pay their proportional share of the costs of those facilities.

d. CLECs provide services in areas where they believe they can make a profit. However, some states have historically required a CLEC to be able to serve every customer in a telephone exchange, thus imposing requirements akin to "carrier of last resort" obligations on CLECs.[11]

e. IXCs are responsible for transit between sending and receiving LECs. Their rates are unregulated.

f. In at least some cases, CEA providers perform transit services between IXCs and LECs. CEA providers do not directly bill customers, but instead finance their operations through access charges assessed to calling parties. CEA providers are subject to rate-of-return regulation, and, according to recent FCC orders, must also keep their prices at or below those of the competing ILEC in their state.[12]

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[10] In some cases, these services may be bundled by a single entity that provides both services.

[11] *See, e.g.,* Iowa Code § 476.29.5 (2015) ("Each local exchange utility has an obligation to serve all eligible customers within the utility's service territory, unless explicitly excepted from this requirement by the board.") (repeal effective July 1, 2017).

[12] *See In re Iowa Network Access Division, Tariff F.C.C. No. 1*, WC Docket No. 18-60, 2018 WL 3641034, at *11 (July 31, 2018); *see also* 47 C.F.R. § 61.38 (describing rate-of-return regulation application to CEA providers); 47 C.F.R. § 61.26 (describing CLEC benchmark applicable to CEA providers).

g. All entities use technologies that have positive fixed costs and non-zero marginal costs to provide access or convey traffic. Marginal costs do not increase with traffic.

49. Under these assumptions, can access stimulation by CLECs be efficient? Note first that CLECs do not engage in access stimulation unless they can profitably offer favorable rates compared to incumbent LECs.[13]

50. Suppose first that CLECs rely, in part, on the CEA provider's facilities (and cover their proportional share of cost, based on traffic), but do not divert customers away from the other members of the CEA provider. Instead, CLECs' access stimulation traffic is all incremental.

51. Then the CLECs' operations increase consumer surplus for all the customers of the CEA provider. When CLECs increase their traffic through CEA provider facilities, it allows the CEA provider and its members to obtain additional economies of scale, thereby also increasing consumer surplus as lower costs become reflected in lower prices.

52. Thus, under these assumptions, the analysis of Propositions 1 and 2 can be applied to show that markets will site incremental traffic with a small network CLEC only when it is efficient.

53. Now suppose that the CLEC does not add any incremental traffic to the CEA provider's network, but simply diverts traffic from other members of the CEA provider. If each LEC can serve all customers at a constant marginal cost, then the competition from the CLEC is again likely to improve allocative efficiency. This follows because the CLEC serves profitable customers but shares fixed costs with the ILECs compromising the CEA provider membership. The CLEC may also stimulate the CEA provider and its member ILECs to adopt less costly technologies.

54. In sum, access stimulation by CLECs that share facilities with CEA providers is likely to be efficient, particularly when that traffic is incremental (*i.e.*, when the

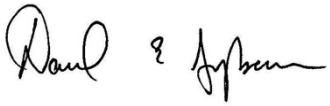
[13] In 2011, the Commission adopted rules that require CLECs that engage in revenue sharing relationships to mirror the rates charged by the lowest cost price-cap LEC in the state. *See* 47 C.F.R. § 61.26(g). *See also* Shane Greenstein & Michael Mazzeo, *Differentiation Strategy and Market Deregulation: Local Telecommunications Entry in the Late 1990s* (Nat'l Bureau of Econ. Research, Working Paper No. 9761, 2003), http://www.nber.org/papers/w9761 (describing how CLECs seek to provide differentiated services as part of a competitive strategy).

ILEC members do not serve high volume customers).

VI. CONCLUSIONS

55. In this report I have shown that, when the costs of operating local networks are subject to economies of scale, "access stimulation" arrangements that increase local volume in return for discounted pricing can be efficient, and, when they are efficient, they will be market equilibria. The scale economies obtained by the smaller network can generate enough consumer surplus to make it possible to outbid the larger network for the traffic, while subsidizing the incremental traffic. This is true even though it is cheaper to site incremental traffic in the larger network, which has already achieved more substantial scale economies.
56. Therefore, overall, these results imply that, under modest assumptions, existing market arrangements concerning the siting of telecommunications traffic are likely to be efficient. Thus, efficiency is not likely to be improved by regulatory interventions that reallocate existing traffic that voluntary market arrangements have currently sited in either large or small networks.
57. In the richer institutional environments, this implies that it is efficient to permit small networks – CLECs and, similarly, rate-of-return regulated CEA providers, which have built out capacity to serve this additional traffic – to keep whatever traffic is sited there. Access stimulation emerges as market equilibria. Otherwise, the efficiencies obtained by these arrangements would be lost.
58. The conclusion that one should respect market outcomes holds whenever regulation or competition causes prices to end user customers to fall and whenever additional scale leads to lower costs. In that case, additional volume in small networks that enable scale economies will also translate into lower prices in those networks and lower prices for end users.

Respectfully submitted,



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ATTACHMENT A

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Honors:
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- *Sloan Foundation Doctoral Dissertation Fellowship*
- *H. B. Earhardt Doctoral Fellowship*
- *William Larimer Mellon Doctoral Fellowship*

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Honors:
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- *Phi Beta Kappa*

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WASHINGTON UNIVERSITY, Olin School of Business
Adjunct Professor of Managerial Economics, 2011-
Associate Professor of Managerial Economics, 1995-1998
Visiting Associate Professor of Managerial Economics, 1993-1995

UNIVERSITY OF CALIFORNIA, BERKELEY
Walter A. Haas School of Business, Visiting Associate Professor, 2001 – 2005
Boalt School of Law, Lecturer, 2002 –

UNIVERSITY OF PENNSYLVANIA, Wharton School of Business
Anheuser-Busch Assistant Professor of Public Policy & Management, 1986-1993
Anheuser-Busch Lecturer in Public Policy & Management, 1985-1986

CARNEGIE-MELLON UNIVERSITY, Tepper School of Business
Instructor, 1982-1984

Consulting Affiliations

COMPASS LEXECON
Senior Consultant, 2008 – 2018

COMPETITION POLICY ASSOCIATES, INC. (COMPASS)
Senior Consultant, 2006 – 2008

LEXECON, INC.
Senior Consultant, 2006 – 2008

CHICAGO PARTNERS, Inc.
Affiliate, 2006 – 2009

LECG
Affiliate, 2007 – 2009
Principal, 1999 – 2007
Co-Director, Emeryville, California Office, 2000-2005
Member, LECG Board of Governors, 2001-2005
Senior Managing Economist, 1998-1999

PUBLICATIONS

1) "The Law and Economics of Concealing Safety Information," with Asrat Tesfayesus. *Journal of Law, Economics and Policy,* Spring 2017, vol. 13, number 2, pp. 181-208.

2) "Certainty Equivalence." *The Palgrave Encyclopedia of Strategic Management,* Edited by Mie Augier and David Teece, Palgrave McMillan, October 2013. https://link.springer.com/referenceworkentry/10.1057/978-1-349-94848-2_623-1.

3) "Civil Conspiracy Claims and the Economics of Collusion," with Christopher Loos and Jonathan Tomlin. *Mass Torts*, Volume 7, Number 3, Summer 2009, pp. 8-11.

4) "Siting Noxious Facilities: Are Markets Efficient?" in Hilary Sigman, editor, The Economics of Hazardous Waste and Contaminated Land, Edward Elgar, 2008. Reprinted from *Journal of Environmental Economics and Management* 29 (1995): S-20 – S-33.

5) "Fly-By-Night or Face-the-Music? Premature Dissolution and the Desirability of Extended Liability," with James Boyd. *American Law and Economics Review* 5 (2003): 189-232.

6) "The Vertical Extension of Environmental Liability Through Chains of Ownership, Contract, and Supply," with James Boyd. In *The Law and Economics of the Environment*, edited by Anthony Heyes, 44-70. Cheltenham, UK: Edward Elgar, 2001.

7) "An Analysis of Settlement and Merit Under Federal Securities Law: What Will be the Effect of the Reform of 1995?" with James Holloway and Ronald King. *Journal of Accounting and Public Policy* 18 (1999): 1-30.

8) "Do Punitive Damages Promote Deterrence?" with James Boyd. *International Review of Law and Economics* 19 (1999): 47-68.

9) "The Search for Deep Pockets: Is 'Extended Liability' Expensive Liability?" with James Boyd. *Journal of Law, Economics, and Organization* 13 (1997): 232-258.

10) "Should 'Relative Safety' be a Test of Product Liability?" with James Boyd. *Journal of Legal Studies* 26 (1997): 433-473.

11) "An Experimental Investigation of Multi-defendant Bargaining in Joint and Several and Proportional Liability Regimes." with Nicholas Dopuch and Ronald R. King. *Journal of Accounting and Economics* 23 (1997): 189-221.

12) "The 'Polluter Pays Principle': Should Liability Be 'Extended' When the Polluter Cannot Pay?" with James Boyd. *The Geneva Papers on Risk and Insurance – Issues and Practice*, no. 79 (1996): 182-203.

13) "Market vs. Government: The Political Economy of NIMBY." with Gerald R. Faulhaber. In *The Political Economy of Environmental Protection: Analysis and Evidence*, Edited by Roger D. Congleton, 169-188. Ann Arbor: The University of Michigan Press, 1996.

14) "Siting Noxious Facilities: Are Markets Efficient?" *Journal of Environmental Economics and Management* 29 (1995): S-20 – S-33. Reprinted in Hilary Sigman, editor, The Economics Of Hazardous Waste And Contaminated Land, Edward Elgar, 2008.

15) "Triggers and Priority: An Integrated Model of the Effects of Bankruptcy Law on Overinvestment and Underinvestment." *Washington University Law Quarterly* 72 (1994): 1341-1377.

16) "Non-Compensatory Damages and Potential Insolvency." with James Boyd. *Journal of Legal Studies* 23 (1994): 895-910.

17) "An Institutional Theory of Divided Government and Party Polarization." with John J. Villani. *American Journal of Political Science* 37 (1993): 429-471.

18) "Incumbent Reputations and Ideological Campaign Contributions in Spatial Competition." *Mathematical and Computer Modeling* 16 (1992): 147-169. (Reprinted in *Formal Theories of Politics II: Mathematical Modeling in Political Science*, edited by P.E. Johnson. Pergamon Press, 1992.)

19) "Presidential Commitment and the Veto." with Dennis A. Yao. *American Journal of Political Science* 35 (1991): 357-389.

20) "Circumventing Formal Structure through Commitment: Presidential Influence and Agenda Control." with Dennis A. Yao. *Public Choice* 70 (1991): 151-179.

21) "Reputational Dynamics in Spatial Competition." *Mathematical and Computer Modeling* 12 (1989): 479-496. (Reprinted in *Formal Theories of Politics:*

Mathematical Modeling in Political Science, edited by P.E. Johnson. Pergamon Press, 1989.)

22) "The Political Economy of Fiscal Policy." with Robert P. Inman. In *Surveys in Public Sector Economics*, edited by Paul G. Hare, 105-160. Basil-Blackwell, 1988.

23) "Reputation, Commitment, and the Dynamics of Effective Legislative Leadership." *Public Choice* 55 (1987): 121-126.

24) "Privatization: Your Rents or Mine?" *Journal of Policy Analysis and Management* 6 (1987): 607-611.

25) "Candidate Reputations and the 'Incumbency Effect.'" with M. Daniel Bernhardt. *Journal of Public Economics* 27 (1985): 47-67.

26) "Running Against the Status Quo: Institutions for Direct Democracy Referenda and Allocations Over Time." *Public Choice* 46 (1985): 19-43.

SCHOLARLY AND ACADEMIC ACTIVITIES: Summary

-More than 75 invited presentations at major universities and conferences.
-Broad teaching experience, including undergraduate, MBA, executive MBA, Ph.D. and thesis supervision.
-Teaching awards/commendations at Haas, Olin and Wharton.
-Chair of committees (including responsibility for curriculum development).
-Organized conferences and faculty seminar series.
-Received more than ten faculty grants and fellowships.

SCHOLARLY PRESENTATIONS

American Law and Economics Association Meetings; American Political Science Association Meetings; California Institute of Technology; Carnegie-Mellon University; Carnegie Conference in Political Economy; Charles River Associates; Columbia University; Conference on Privatization of the Public Sector (University of Pennsylvania); Conference on Political Behavior and Institutions (Stanford); European Association of Law and Economics; George Mason University; Georgetown University; Hoover Institution; Information in Politics (Texas); LECG; Lehigh University; Northwestern University; Olin Conference on Law, Economics and Politics of the Environment; Olin School Annual Conference on Financial Economics and Accounting; Princeton University; Public Choice Society; Resources for the Future; Social Science History Association Meetings; Southern Economics Association Meetings; Southern Political Science Association Meetings; Stanford University; Texas A&M University; UCLA; UCSD; United States Department of Justice; University of Delaware; University of

Minnesota; University of Rochester; University of Pennsylvania; University of Southern California; Villanova University; Washington University in St. Louis; Washington University Conference on Bankruptcy; Western Economic Association Meetings.

EDITORIAL ACTIVITIES

Referee Reports for: American Economic Review, American Journal of Political Science, American Political Science Review, Econometrica, Economics and Politics, Formal Theories of Political Science, Games and Economic Behavior, International Review of Law and Economics, Journal of Development Economics, Journal of Law and Economics, Journal of Law Economics and Organization, Journal of Policy Analysis and Management, Journal of Public Economics, Public Choice, Quarterly Journal of Economics, Review of Economic Studies.

ACADEMIC ACTIVITIES

A. Teaching Awards

Dean's Commendation, Haas School, 2004.

Reid Award for Undergraduate Teaching at Olin, 1995.

Wharton Undergraduate Teaching Award, 1990-1991.

Nominated for Anvil Award, Wharton MBA Teaching Award, 1990.

Nominated for Lindback Award, University of Pennsylvania Teaching Award, 1988.

B. Courses Taught

1) Undergraduate courses

"Law & Economics I (Private Law)" (LS 145: 2002, 2004, 2005, 2006).

"Law & Economics II (Public Law)" (LS 147: 2008, 2010).

"Business Strategy in the Legal Environment" (MECO 390: 1995-1996).

"Business and Public Policy" (MGT 382: 1994-1996).

"Business in the Political Environment" (PPM 203: 1990-1991).

"Economic Policy Analysis" (ECON 30: 1987-1989).

"The Political Economy of Government" (PPM 201: 1986-1989, 1991).

"Political Analysis" (PPM 05: 1992).

"Principles of Economics" (ECON 001: 1985-1986).

2) Graduate courses

"Competitive Strategy and Industry Analysis" (Olin-Fudan Executive MBA program; 2011-2014).

"Economic Analysis for Business Decisions 2" (Macroeconomics; EWMBA201B: 2005).

"Economic Analysis for Business Decisions 1" (Microeconomics and Competitive Strategy; EWMBA201A: 2001, 2002, 2003).

"Independent Study in Competitive and Corporate Strategy" (E293: 2002).

"Independent Study in Econometrics and Empirical Methods" (E293: 2003).

"Competitive and Corporate Strategy" (E210: 2001).

"Business in a Changing Environment" (MGT 5040: 1994-1995).

"Business-Government Relations" (MGT 741/PPM 780: 1992, 1993).

"Governmental and Legal Environment of Business" (LST 621: 1992).

"Managerial Economics" (MGEC 601: 1989-1990; EMBA 790: 1993-1994; MECO 5402 [macro], 5403 [micro]: 1996-1997).

"PhD Research Methods Seminar" (PPM 900: 1987-1990).

"Political Analysis" (PPM 781, 981: 1992).

"The Political Economy of Government" (PPM 770: 1991-1993).

"Social Choice and Social Justice" (PPM 911: 1986-1987, 1990, 1992).

C. Academic Committees

Chairman, BSBA Committee (undergraduate curriculum committee), Olin School, 1995-1996.

Member, MBA and PMBA committees (full- and part-time MBA curriculum committees), Olin School, 1995-1996.

Chairman, Subcommittee on Revising Business Curriculum, Undergraduate Curriculum Committee, The Wharton School, Fall 1988 - Spring 1990.

Member, Undergraduate Executive Committee, The Wharton School, Fall 1989-1993.

Member, Undergraduate Curriculum Committee, The Wharton School, Fall 1986-1990, 1991-1992.

Dean's Representative, CAS Committee on Individualized Study, University of Pennsylvania, Fall 1987 - Spring 1989.

Dean's Representative, Committee on Undergraduate Admissions and Financial Aid, University of Pennsylvania, Fall 1987 - Spring 1989.

D. Dissertation Committees

"Liability and Insolvency: An Equilibrium Analysis." (James Boyd; Howard Kunreuther, chair; 1992).

"Workers' Compensation vs. First Party Insurance for Occupational Disability." (Dong-Han Chang; Patricia Danzon, chair; 1991).

"Liability Laws and Environmental Policy: The Logic of Joint and Several Liability." (M.V. Rajeev Gowda; Howard Kunreuther, chair; 1991)."Essays on Maximum Demand in Electricity." (Seong-Uh Lee; Paul Kleindorfer, chair; 1990).

"Essays on the Political Economy of Resource Allocation Through Democratic Processes." (Miftah Ahmad; Robert Inman, chair; 1990).

"Three Essays on the Role of Institutional Arrangements in International Economic Organizations' Policy Making." (Bernard Gauthier; Daniel Ingberman, chair; 1989).

"Competitive Processes of Collective Decision Making Under Simple Majority Rule." (Joon-Han Kim; James Laing, chair; 1987).

E. Conferences and Seminars Organized

Seminar organizer, Public Policy and Management Brown-Bag Seminar Series, University of Pennsylvania, 1991-1992.

Seminar organizer, Political Economy Workshop (joint Economics/Public Policy and Management), University of Pennsylvania, 1990.

Co-convener, PARSS Faculty Seminar: "Environmental Risk and Public Policy," The Wharton School, 1988-1993.

Founding member (with R. Hartwell, R. Inman, H. Root), PARSS (Mellon) Faculty Seminar: "Historical Data and Theories of Rational

Choice," University of Pennsylvania, 1985-1989.

Conference organizer, "Environmental Risk and Real Estate Development," The Wharton School, December 1988.

Conference organizer (with S. Wachter), "Public Policy and Affordable Housing," The Wharton School, February 1990.

F. Grants, Honors, & Awards

University Research Foundation Grant University of Pennsylvania, 1987, 1991.

Junior Faculty Summer Research Fellowship The Wharton School, 1986, 1987, 1988, 1989.

PARSS Faculty Research Fellowship University of Pennsylvania, 1986.

MOIS Courseware Development Grant University of Pennsylvania, 1986, 1987.

Alexander Henderson Award for Excellence in Economic Theory Carnegie-Mellon University, 1985.

Alfred P. Sloan Doctoral Dissertation Fellowship in Economics. The Sloan Foundation, 1984-1985.

H. B. Earhardt Doctoral Fellowship Carnegie-Mellon University, 1982-1983.

William Larimer Mellon Ph.D. Fellowship Carnegie-Mellon University, 1981-1984.

Phi Beta Kappa 1981.

Expert Disclosures, 2000-present

Ashton Woods Holdings, L.L.C. et al. vs. USG Corporation, et al. (Alleged price-fixing damages.) United States District Court for the Eastern District Of Pennsylvania, Case No. 2:15-cv-01712-MMB (E.D. Pa.), MDL 2437 No. 13-MD-2437. Retained by plaintiffs Ashton Woods Holdings, L.L.C. et al. Expert Reports, December 22, 2017 and January 26, 2018. Deposition, April 19, 2018.

Conlin vs. Magnum, Inc., et al. (Alleged successor liability for defective product.) Superior Court of the State of California, San Joaquin County, Case No. 39-2013-00292938-CU-PL-STK. Retained by defendant Magnum Research, Delaware. Deposition, July 8, 2016.

THX Ltd. v. Apple Inc. (Alleged patent infringement damages.) United States District Court for the Northern District of California, Case No. 3:13-cv-01161-IISG. Retained by plaintiff THX.

Move, Inc., et al., vs. Zillow, Inc., et al. (Alleged trade secret misappropriation, defamation, and abuse of process damages.) Superior Court of the State of Washington, King County, Case No. No. 14—07669-0 SEA. Retained by defendant and counter-claimant Zillow. Expert Report, February 1, 2016. Deposition, March 17, 2016.

Merced Irrigation District, Pacific Gas & Electric Company, and Federal Insurance Company, as subrogee of ACWA Joint Powers Insurance Authority vs. Hart High-Voltage Apparatus Repair and Testing Co., Inc. (Alleged negligence damages.) Superior Court of the State of California, County of Merced, Case No. CVM013599, CV003013. Retained by defendant Hart.

Grail Semiconductor, Inc. v. Mitsubishi Electric and Electronics USA, Inc., et al. (Economic analysis of the semiconductor industry.) Superior Court of the State of California, County of Santa Clara, Case No. 1-07-CV-098590. Retained by plaintiff Grail Semiconductor.

Prolifiq Software, Inc. v. Veeva Systems, Inc. (Alleged patent infringement damages.) United States District Court for the Northern District Of California, Case No. 3:13-CV-03644-SI. Retained by defendant Veeva Systems.

Samsung v. Qualcomm (Alleged anticompetitive use of FRAND patents, and FRAND patent infringement damages.) National Development and Reform Commission (NDRC), People's Republic of China. Retained by plaintiff Samsung. Expert Report, July 1, 2014 (co-authored with Sang Seung Yi).

CA, Inc., d/b/a CA Technologies, v. New Relic, Inc. (Alleged patent infringement damages.) United States District Court, Eastern District Of New York, Case No. 2:12-cv-05468-JS-WDW. Retained by defendant New Relic. Expert Report, February 14, 2014. Deposition, March 13, 2014.

Lifescan, Inc. and Johnson and Johnson, v. Shasta Technologies, LLC, Decision Diagnostics Corp., Pharmatech Solutions, Inc., and Conductive Technologies Inc. (Alleged violations of the Lanham Act with monopolization counterclaims.) United States District Court for the Northern District Of California, Case No. V-12-360-KAW. Retained by defendants.

Michele LeComte Chambers et. al. v. Gold Medal Bakery, Inc., Bakery Products Corp., et al. (Alleged trademark infringement royalties.) Superior Court Commonwealth of Massachusetts, Case No. 2009-00716. Retained by plaintiffs. Expert Report, February 29, 2012. Rebuttal Report, April 29, 2013. Expert Declaration, March 14, 2014.

Nicolosi Distributing, Inc., v. BMW of North America, LLC. (Alleged tying and unfair competition.) United States District Court for the Northern District of California, Case No. CV-10-3256. Retained by plaintiff Nicolosi Distributing. Expert Report, April 1, 2011.

American Traffic Solutions, Inc. v. Redflex Traffic Systems, et. al. (Damages due to alleged violations of the Lanham Act.) United States District Court for the District of Arizona, Case No. 2: 08-CV-02051-PHX-FJM. Retained by plaintiff American Traffic Solutions. Expert Report, July 15, 2009. Rebuttal Report, October 7, 2009. Deposition, January 7, 2010.

Glasforms, Inc. and Dong Ah Rubber and Tire CO., LTD v. CTG International. (Damages resulting from alleged breach of contract, breach of implied warranty of fitness for a particular purpose, and breach of implied warranty or merchantability.) United States District Court, Northern District of California, San Jose Division, Case No. C 06-03359 JF. Retained by plaintiff/defendant/third party plaintiff, Glasforms Inc. Expert Report, September 8, 2008. Deposition, April 22, 2009. Testified in trial, September 8, 2009.

Memry Corporation and Schlumberger Technology Corporation v. Kentucky Oil Technology, et al. (Damages resulting from alleged misappropriation of trade secrets.) United States District Court, Northern District of California, San Jose Division, Case No. CV 04-03843 RMW (HRL). Retained by defendant/counterclaimant, Kentucky Oil. Expert Report, January 19, 2007. Testified in deposition, March 8, 2007. Testified in trial, December 11, 2007.

In re Dynamic Random Access Memory (DRAM) Antitrust Litigation. (Alleged price fixing.) United States District Court, Northern District of California, San Francisco Division, MDL #1486, Master File No. M-02-1486-PJH. Retained by defendant, Samsung. Expert Declaration, October 15, 2007.

MAX Software, Inc. v. Computer Associates, Inc. (Damages resulting from alleged misappropriation and other intellectual property claims.) American Arbitration Association, Case No. 13117 Y 02365 05. Retained by claimant, MAX Software. Expert Report, February 12, 2007. Supplemental Report, March 8, 2007. Rebuttal Report, March 27, 2007.

Collaboration Properties, Inc. v. Tandberg ASA and Tandberg, Inc. (Damages

resulting from alleged patent infringement.) United States District Court, Northern District of California, San Francisco Division, Case No. C 05 01940. Retained by plaintiff, Collaboration Properties. Expert Report, January 26, 2007.

Gens v. Ferrell. (Damages resulting from alleged breach of contract and misappropriation of trade secrets.) Superior Court of the State of California, County of San Mateo, Case No. CIV 439400. Retained by plaintiff/counterdefendant, Gens. Testified in deposition, March 6, 2006.

In re Linens Antitrust Litigation. (Damages resulting from alleged violations of the Sherman Act.) United States District Court, Southern District of New York, Case No. 03 Civ. 7823. Retained by defendant, Best Metropolitan. Expert Report, January 13, 2006.

UTStarcom v. Starent Networks Corp. (Intellectual property damages and analysis of alleged irreparable marketplace injury.) United States District Court, Northern District of California, San Jose Division, Case No. C 04 01122 PVT (ADR). Retained by plaintiff/counterdefendant, UTStarcom, Inc. Expert Declaration, February 15, 2005. Testified in deposition, March 24, 2005.

AT&T Corporation v. Sprint Corporation, et. al. (Alleged trademark infringement damages under the Lanham Act.) United States District Court, Southern District of New York, Case No. 03 Civ. 2118 (DLC). Retained by claimant, AT&T Corp.

Accela, Inc. v. Atlantic Management Center, Inc. (Damages resulting from alleged breach of contract.) American Arbitration Association, Case No. 74 117 01119 03 TNC. Retained by claimant, Accela, Inc. Expert Report, June 9, 2004.

Gracenote, Inc. v. MusicMatch, Inc. (Alleged patent misuse; antitrust analysis.) United States District Court, Northern District of California, Oakland Division, Case No. C 03-3162 CW. Retained by plaintiff /counterdefendant, Gracenote, Inc. Expert Report, March 12, 2004. Testified in deposition, July 29, 2004.

William D. Hoffman, on behalf of the General Public of the State of California v. American Express Travel Related Services Co., and Does 1-50. (Damages analysis.) Superior Court of the State of California for the County of Alameda, Case No. 2001-022881. Retained by plaintiff class. Expert Declaration, January 19, 2004.

GTD Enterprises v. The Board of Trustees of the Leland Stanford Junior University and Stuart Moldaw (Analysis of alleged violations of California Business and Professions Codes § 17200, § 17045 and § 17048, and antitrust claims.) Superior Court of the State of California, County of Santa Clara, Case No. CV 786012. Retained by the defendants, Stanford University, et. al. Expert Declaration, June 25, 2003. Expert Report, August 6, 2003.

In Re Cleveland Bar Association v. CompManagement, Inc., et al. (Economic impact analysis.) Board of Commissioners on the Unauthorized Practice of Law of the Supreme Court of Ohio. Retained by respondent, CompManagement, Inc.

Expert Report, April 21, 2003. Testified May 22, 2003.

Computer Motion, Inc. v. Intuitive Surgical, Inc. (Alleged patent infringement damages.) United States District Court, Central District of California, Western Division, Case No. CV 00-4988 CBM (RCx). Retained by plaintiff, Computer Motion, Inc. Expert Report, January 27, 2003.

Tickets.com, Inc. v. Oakland Coliseum Joint Venture, LLC/SMG. (Analysis of alleged breach of contract.) American Arbitration Association, Case No. 72 181 01083 02 SACO. Retained by claimant/counterrespondent, Tickets.com. Expert Report, November 1, 2002. Testified in deposition, November 27, 2002. Testified January 13, 2003.

Linda Schilcher v. Board of Trustees of the University of Arkansas, et al. (Damages resulting from alleged wrongful termination and employment discrimination.) United States District Court, Western District of Arkansas, Fort Smith Division, Case No. 00-5213. Retained by defendant, University of Arkansas. Expert Report, May 15, 2002. Testified in deposition, May 30, 2002.

Osmonics, Inc., and Poretics Corporation v. James Humphrey, et al. (Analysis of alleged breach of contract and unfair competition.) Superior Court of the State of California in and for the County of Alameda, Eastern Division, Case No. V-013547-0. Retained by plaintiffs Osmonics and Poretics.

People of the State of California v. ALVA-AMCO Pharmacal Cos. Inc., et al. (Statistical and damages analysis.) Superior Court of the State of California for the County of San Francisco. Retained by defendant, Johnson & Johnson.

Quintero-Smith, Inc. v. Herman Miller, Inc. and Herman Miller, Inc., Miller SQA, Inc. (Intellectual property damages.) United States District Court, Central District of California, Case No. 00-2745 TJH. Retained by plaintiff, Quintero-Smith, Inc.

Sargon Enterprises, Inc. v. University of Southern California, et al. (Damages due to alleged breach of contract and fiduciary duty, antitrust claims, and violations of California Business and Professions Code § 17200.) Superior Court of the State of California for the City of Los Angeles, Central District, Case No. BC209992. Retained by defendant/counterclaimant, University of Southern California.

Michael and Sandy Krummes v. Papa Murphy's International, Inc. (Damages due to alleged breach of contract and breach of fiduciary duty.) Retained by defendant, Papa Murphy's International, Inc. Expert Report, January 25, 2001.

R.J. Reynolds Tobacco Company and GMB, Inc., v. Premium Tobacco Stores, Inc., et al. (Analysis of alleged antitrust violations and unfair trade practices.) United States District Court for the Northern District of Illinois, Eastern Division, Case No. 99 C 1174. Retained by plaintiff/counterdefendant, R.J. Reynolds Tobacco Company.

Larsen Electric Sign Company, Inc. v. A. Kent Greene, et al. (Damages due to alleged breach of contract and breach of fiduciary duty.) District Court of Clark

County Nevada, Case No. A368306. Retained by defendant, A. Kent Greene. Testified in deposition, September 15, 2000.

Kay T. Nunnally, et al. v. R.J. Reynolds Tobacco Company and Basic Foods, Inc. (Analysis of punitive damages.) Circuit Court of Desoto County Mississippi. Retained by defendant, R.J. Reynolds Tobacco Company.

Microchip Technology, Inc. v. Scenix Semiconductor, Inc., and Parallax, Inc., And Related Counterclaims (Antitrust analysis of alleged patent misuse and invalidity claims.) United States District Court, Northern District of California, San Francisco Division, Case No. C97-03923 WHO. Retained by defendant/counterclaimant, Scenix Semiconductor, Inc. Expert Declarations, June 22, 2000 and August 17, 2000.

Louis H. Erichs, et al. v. Venator Group, Inc. (Statistical analysis; employment compensation/commission.) United States District Court for the Northern District of California, Case No. C 98-2981 SBA. Retained by Defendant, Venator Group, Inc. Expert Declaration, March 10, 2000.

Selected Non-Testifying Consulting Engagements, 2000-present

Antitrust

AT&T / T-Mobile (proposed) Merger. Retained by plaintiff DOJ.

In Re: Cathode Ray Tube (CRT) Antitrust Litigation. United States District Court Northern District Of California, San Francisco Division. Master File No. CV-07-5944-SC MDL No. 1917. Retained by defendant Samsung SDI.

In Re: Cigarette Antitrust Litigation. United States District Court Northern District of Georgia, Atlanta Division. MDL docket No. 1342, Civil Action No: 1:00-CV-0447-JOF. Retained by defendants.

In the Arbitration of Cisco Systems, Inc. and Alcatel S.A. and affiliates. Alleged exclusivity and tying. Retained by defendant Cisco.

In Re: DRAM Antitrust Litigation. Department of Justice criminal investigation. Retained by defendant Samsung Electronics.

DRAM Claims Liquidation Trust, By its Trustee, Wells Fargo Bank, N.A., v. Hynix Semiconductor, Inc., et. al. and Edge Electronics, Inc., v. Hynix Semiconductor, Inc., et. al. United States District Court Northern District Of California. Case Nos. C 07-1381 PJH and C 07-01207 PJH. Retained by defendant Samsung Electronics.

In Re TFT-LCD (Flat Panel) Antitrust Litigation. United States District Court Northern District Of California, San Francisco Division. Master File No. CV-07-5944-SC MDL No. 1917. Retained by defendant Samsung.

Mergers in food products industries. Retained by merging parties.

Mergers in entertainment industries. Retained by merging parties.

Mergers in semiconductor manufacturing. Retained by merging parties.

Alleged monopolization and predatory pricing in microprocessors. Retained by defendant.

Alleged price fixing in disk drives. Retained by defendant.

In Re: Methyl Tertiary Butyl Ether ("MTBE") Products Liability Litigation. United States District Court, Southern District of New York. Master File No. 1:00 -1898 MDL 1358 (SAS) M21-88.

Information Resources, Inc. v. The Dun & Bradstreet Corporation, A.C. Nielsen Co. and IMS International, Inc. United States District Court for the Southern District of New York, Case No. 05-0564. Retained by defendant A.C. Nielsen.

Erinmedia, LLC, v. Nielsen Media Research, Inc. Defendant. United States District Court for the Middle District of Florida, Tampa Division. Civil Action 8:05-CV-01123-SCB-EAJ. Retained by defendant Nielsen.

Visx, Inc. v. Nidek Co., Ltd. United States District Court Northern District Of California. Consolidated Nos. C98-04842, C99-1528 CRB. Retained by patent defendant and antitrust plaintiff Nidek.

Alleged price fixing in specialty metals. Retained by defendant manufacturer.

Alleged price fixing in tourist services. Retained by defendant seller.

Alleged price discrimination in retail sales. Retained by defendant sellers.

Alleged price discrimination, unfair competition, and monopolization in electronics distribution. Retained by defendant sellers.

In re: Nylon Carpet Antitrust Litigation. United States District Court, N.D. Georgia. Case No. 4:98-cv-00267. Retained by defendant Shaw Industries.

In re: Polypropylene Carpet Antitrust Litigation. United States District Court, N.D. Georgia. Rome Division. No. MDL 1075. Retained by defendant Shaw Industries.

Rambus Inc., v. Micron Technology, Inc., et al. Superior Court of the State of California, City and County of San Francisco. Case No. 04-431105. Retained by defendant Samsung Electronics.

Republic Tobacco, L.P., v. North Atlantic Trading Company, Inc., et al. United States District Court, N.D. Illinois, Eastern Division. Case No. 98 C 4011. Retained by defamation plaintiff and antitrust defendant Republic Tobacco.

In Re: Tableware Antitrust Litigation. United States District Court Northern District of California. Master File No. C-04-3514-VRW. Retained by defendant Federated.

United States of America v. Philip Morris Inc., et al. United States District Court, District of Columbia. Case No. 99-CV-2496 (GK). Retained by defendant tobacco companies.

Owens Corning v. R.J. Reynolds Tobacco Company, et al. Circuit Court of Jefferson County, Mississippi, Case No. 96-0065. Retained by defendant tobacco companies.

Deloach v. Philip Morris Companies, Inc. United States District Court, District of Columbia. No. Civ.A. 00-294(GK). Retained by defendant tobacco companies.

Leslie Whitely, et al. v. Philip Morris and R.J. Reynolds Tobacco Holdings. Superior Court, San Francisco County, California. Case No. 303184. Retained by defendant Philip Morris.

Fredric Reller, vs. Philip Morris Inc., et al. Superior Court of the State of California, County of Los Angeles. Case No. BC 261796. Retained by defendant

Philip Morris.

Lawrence Lucier and Laurie Lucier v. Philip Morris, Incorporated, et al. In The Superior Court of the State Of California, County of San Francisco. Retained by defendant Philip Morris.

In Re Static Random Access Memory (SRAM) Antitrust Litigation. United States District Court Northern District Of California, Oakland Division. Master File No. M:07-cv-01819-CW, MDL No. 1819. Retained by defendant Samsung Electronics.

Buddy Lynn, et al. v. Amoco Oil Company, et al. United States District Court, Middle District of Alabama, Northern Division. Civil action no. 96-T-940-N, 2:96cv940-MHT. Retained by defendant Amoco.

Intellectual Property

Asyst Technologies, Inc., v. Empak, Inc., Emtrak Inc., Jenoptik AG, Jenoptik Inf Ab, Inc., and Meissner+ Wurst GmbH. United States District Court for the Northern District of California. No. 98-20451 JF. Retained by defendant and counterclaimant Jenoptik.

Baxter Healthcare Corporation, Baxter International Inc., Baxter Healthcare Sa, and Deka Products Limited Partnership, v. Fresenius Medical Care Holdings, Inc., d/b/a Fresenius Medical Care North America, and Fresenius Usa, Inc. United States District Court Northern District of California, San Francisco Division. Retained by defendant Fresenius.

Fresenius Medical Care Holdings, Inc., and Fresenius USA, Inc. v. Baxter Healthcare Corporation, Baxter International Inc. United States District Court Northern District of California, Oakland Division. Retained by plaintiff and counter defendant Fresenius.

GlaxoSmithKline LLC, v. Genentech, Inc. In The United States District Court For The District Of Delaware. Civil Action No. 10-799-GMS. Retained by defendant Genentech.

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al. United States District Court Northern District of California, San Jose Division. CASE No. CV-00-6506 MRP (AJWx). Retained by plaintiff and counterdefendant Nellcor.

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Products Liability and Punitive Damages

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Pharma products made allegedly defective due to failure to warn of side effects. Analysis of class certification and damages for defendant major pharmaceutical manufacturer.

Professional liability. Analysis of damages and punitive damages for alleged professional negligence, for defendant law firm.

Veil-piercing analysis. Analysis for owners of acquired entities with potential liabilities in excess of the entities' own capitalizations.

Competitive Strategy

Joint ventures in high-tech and other industries. Retained by joint venture partners.

Lobbying and campaign contributions. Retained by various entities.

Competitive acquisitions. Retained by acquiring parties.

Strategy formulation in "network" industries. Retained by various entities.